WHAT IS CLAIMED IS:

CLAIM 1. Optical signal apparatus, comprising:

an input port, said input port receiving optical signals comprising a plurality of wavelength components, each wavelength component having a wavelength selected from a plurality of predetermined wavelengths;

an output port

a third port;

first optical apparatus coupled to said input port, said output port and said third port, said optical apparatus coupling optical signals from said input port in a first direction to said third port and coupling optical signals in a second direction at said optical signal third port to said output port;

an add port, said add port receiving add optical signals comprising at least one add wavelength component of a group of one or more predetermined add wavelength components, each of said add wavelength components having a predetermined wavelength selected from said plurality of predetermined wavelengths;

a drop port;

a sixth port;

second optical apparatus coupled to said add port, said drop port and to said sixth port, said optical apparatus coupling optical signals from said add port in a first direction to said sixth port, and coupling optical signals from said sixth port in said second direction to said drop port; and

Michelson interferometer apparatus coupled to said third port and said sixth port, comprising:

a first optical path and a second optical path;

a coupler coupling said third port to said first optical path and to said second optical path, and coupling said sixth optical port to said first optical path and to said second optical path, said coupler splitting optical signals from said third port propagating in said first propagation direction into wavelength component first portions propagating on said first optical path and into wavelength component second portions propagating on said second optical path, and splitting add optical signals from said sixth port propagating in said first propagation direction into add wavelength component first portions propagating on said first path and into add wavelength component second portions propagating on said second path, said optical signals comprising a plurality of predetermined wavelength components, said coupler coupling wavelength components of optical signals propagating in a second direction either to said output port or to said drop port;

a plurality of phase modulators disposed in said first path, each of said phase modulators adapted to receive a wavelength component first portions and add wavelength component first portions at a predetermined one of said wavelengths, each phase modulator selectively provides a predetermined phase modulation to said received wavelength component first portions and said received add wavelength component first portions to control coupling of the corresponding wavelength component or the corresponding add wavelength component to said output port.

CLAIM 2. Apparatus in accordance with claim 1, wherein:

each said phase modulator controls coupling of wavelength components to said drop port.

CLAIM 3. Apparatus in accordance with claim 2, wherein:

said coupler operates in cooperation with each said phase modulator such that when said each said phase modulator controls coupling of said add wavelength component to said output port, said corresponding wavelength component is coupled to said drop port.

CLAIM 4. Apparatus in accordance with claim 1, wherein:

said predetermined phase modulation is selected for each said phase modulator from a first predetermined phase shift and a second predetermined phase shift.

CLAIM 5. Apparatus in accordance with claim 4, wherein:

when said predetermined phase modulation is said first predetermined phase shift, the corresponding wavelength component is coupled to said output port.

CLAIM 6. Apparatus in accordance with claim 5, wherein:

when said predetermined phase modulation is said second predetermined phase shift, the corresponding add wavelength component is coupled to said output port and said corresponding wavelength component is coupled to said drop port.

CLAIM 7. Apparatus in accordance with claim 6, comprising:

a controller coupled to each said phase modulator, to select said first and said second predetermined phase shifts.

CLAIM 8. Apparatus in accordance with claim 1, comprising:

a controller coupled to each said phase modulator, to select said predetermined phase modulation.

CLAIM 9. Apparatus in accordance with claim 1, wherein:

said optical signals comprise said wavelength components as wavelength multiplexed signals.

CLAIM 10. Apparatus in accordance with claim 9, wherein:

said add optical signals comprise said add wavelength components as wavelength multiplexed signals.

CLAIM 11. Apparatus in accordance with claim 1, comprising:

multiplex/de-multiplex apparatus disposed in said first path and coupled to said each of said phase modulators to de-multiplex multiplexed wavelength component first portions and multiplexed add wavelength component first portions and to multiplex said wavelength component first portions and said add wavelength component first portions.

CLAIM 12. Apparatus in accordance with claim 1, wherein:

said coupler is a 50/50 coupler.

CLAIM 13. Apparatus in accordance with claim 1, wherein:

said first optical apparatus comprises a circulator.

CLAIM 14. Apparatus in accordance with claim 13, wherein:

said second optical apparatus comprises a circulator.

CLAIM 15. Apparatus in accordance with claim 1, wherein:

each said optical phase modulator comprises a phase shifter responsive to a control signals in a first control state to provide a first phase shift and responsive to a control signals in a second control state to provide a second phase shift.

CLAIM 16. Apparatus in accordance with claim 15, comprising:

a controller coupled to each of said optical phase shifters to provide said control signals.

CLAIM 17. Apparatus in accordance with claim 15, wherein:

said first phase shift is selected so that a wavelength component first portion and an add wavelength component first portion respectively interferes with a corresponding wavelength component second portion and corresponding add wavelength component second portion to produce a first interference result.

CLAIM 18. Apparatus in accordance with claim 17, wherein:

said second phase shift is selected so that a wavelength component first portion and an add wavelength component first portion respectively interferes with said corresponding wavelength component second portion and said add wavelength component second portion to produce a second interference result.

CLAIM 19. Apparatus in accordance with claim 18, wherein:

said first interference result is that the corresponding wavelength component is coupled to said output port, and the corresponding add wavelength component is not coupled to said output port.

CLAIM 20. Apparatus in accordance with claim 19, wherein:

said second interference result is that the corresponding add wavelength component is coupled to said output port and said corresponding wavelength component is coupled to said drop port.

CLAIM 21. Apparatus in accordance with claim 18, wherein:

said second interference result is that the corresponding add wavelength component is coupled to said output port and the corresponding wavelength component is coupled to said drop port.

CLAIM 22. Optical apparatus, comprising:

a first circulator having an input port, an output port and a third port;

a second circulator having an add port, a drop port and a sixth port;

a Michelson interferometer comprising:

a coupler having a first port coupled to said third port, and a second port coupled to said sixth port;

first and second optical paths coupled to said coupler;

a reflector portion terminating said second path;

said first path comprising a plurality of branches, each of said branches comprising a phase modulator for selectively phase modulating one wavelength component of wavelength multiplexed optical signals comprising a plurality of predetermined wavelength components;

a plurality of second reflector portions, each of said second reflector portions terminating a corresponding one of said branches; and

a controller for selectively controlling each of said phase modulators such that wavelength components of optical signals at said input port are selectively coupled to said output port or said drop port and wavelength components of add optical signals at said add port are selectively coupled to said output port.

CLAIM 23. Apparatus in accordance with claim 22, wherein:

each said phase modulator is operable to determine whether or not a predetermined wavelength component is coupled from said input port to said output port or from said add port to said output port.

CLAIM 24. A method for selectively coupling wavelength components of wavelength division multiplexed optical signals from an input port to an output port or a drop port and selectively coupling one or more corresponding wavelength components of wavelength division multiplexed add optical signals from an add port to said output port, comprising:

providing a Michelson interferometer;

providing a first circulator to couple said input and said output ports to said Michelson interferometer;

providing a second circulator to couple said add port and said drop port to said Michelson interferometer;

providing in said Michelson interferometer one path having a plurality of phase modulators each selectively operable on wavelength components of said optical signals and said add optical signals at one predetermined wavelength;

controlling said plurality of phase modulators such that each phase modulator determines whether a corresponding wavelength component of said optical signals or of said add optical signals is coupled to said output port, and if a corresponding wavelength component of said add optical signals is coupled to said output port to couple said corresponding wavelength component of said optical signals to said drop port.

CLAIM 25. A method in accordance with claim 24, comprising:

utilizing a controller to control each said phase modulator.

CLAIM 26. A method in accordance with claim 24, comprising:

utilizing a phase shifter for each said phase modulator;

CLAIM 27. A method in accordance with claim 24, comprising:

separating said multiplexed wavelength components of said first optical signals into non-multiplexed wavelength components; and

coupling each non-multiplexed wavelength component to a corresponding one of said phase modulators.